Serial Number 10/501,327

AMENDMENTS TO CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) Method of performing geometrical measurements on an object, comprising the steps of: illuminating the object with a light beam having a field distribution with substantially constant intensity, so as to obtain, past the object, a field distribution with discontinuity points in correspondence with points concerned by the measurement; submitting the beam past the object to a spatial optical filtering; detecting the filtered beam thereby generating an electrical signal representative of the intensity of the field associated with the filtered beam; and obtaining the value of a requested quantity by processing said electrical signal; characterized in that said spatial filtering is a band-pass filtering originating on a detection plane a continuous field distribution that is the sum of a plurality of functions which are identical to one another apart the sign, are centered exactly in correspondence with a discontinuity point and only depend on the characteristics of the band-pass filtering, said field distribution having an intensity exhibiting a pair of marked maxima separated by a minimum in correspondence with each discontinuity point, said processing of the electrical signal providing the position of said minimum relative to an axis of the measurement beam, wherein a spacing between said minima at said discontinuity points corresponds to a size of said object.

2. (Previously Presented) A method as claimed in claim 1, characterized in that said processing of the electrical signal comprises a band-pass filtering, with temporal cut-off frequencies corresponding with the spatial cut-off frequencies of the optical band-pass filtering.

3. (Previously Presented) A method as claimed in claim 1, characterized in that at least one of said discontinuity points is formed by an edge of the object.

4. (Previously Presented) A method as claimed in claim 1, characterized in that said optical band-pass filtering originates, on said detection plane, a continuous field distribution comprising, in correspondence with each discontinuity point, oscillating groups of which the oscillation frequencies and the durations depend on the characteristics of the band-pass filtering and the oscillation center is related with the position of the respective discontinuity point, the oscillation groups having intensities exhibiting said pair of marked maxima separated by a minimum in accordance with the oscillation center.

5. (Previously Presented) A method as claimed in claim 4, characterized in that said optical band-pass filtering is carried out by means of a filter comprising an opaque region center on the axis of the beam and having a first width (w_{lo}), and a transparent region also centered on the axis of the beam and having a second width (w_{hi}), greater than the first width.

6. (Previously Presented) A method as claimed in claim 5, characterized in that said first and second widths (w_{lo}, w_{hi}) meet the condition $2.5 \leq w_{hi}/w_{lo} \leq 7$.

7. (Previously Presented) A method as claimed in claim 6, characterized in that said first and second widths (w_{lo}, w_{hi}) meet the condition $w_{hi}/w_{lo} = n$, n being an odd integer number.

8. (Previously Presented) A method as claimed in claim 7, characterized in that said first and second widths (w_{lo}, w_{hi}) meet the condition $w_{hi}/w_{lo} = n$, where $n \leq 5$.

9. (Previously Presented) A method as claimed in claim 1, characterized in that said optical band-pass filtering is carried out by means of a filter comprising opaque and transparent regions asymmetrically arranged with respect to the axis of the beam.

10. (Previously Presented) A method as claimed in claim 1, characterized in that said optical band-pass filtering is carried out by means of a filter having a gradual transmittance variation between regions arranged in correspondence of the pass band and regions arranged in correspondence of bands to be rejected.

11. (Previously Presented) A method as claimed in claim 1, characterized in that said optical band-pass filtering is carried out by means of a filter consisting of a grating.

12. (Previously Presented) An optical device for performing geometrical measurements on an object, comprising:

- means for generating a monochromatic light beam having a field distribution with substantially constant intensity, the object being placed along the path of the beam so as to generate, in the field distribution past the object itself, discontinuity points in correspondence with points concerned by the measurement;
- optical processing means, comprising a first and a second confocal converging lens and a spatial filter placed in the common focal plane of said lenses, said optical processing means being located past the object so that the latter is located in the focal plane of the first lens opposite to the common focal plane;
- detection means located in the focal plane of the second lens opposite to the common focal plane, to collect a filtered beam outgoing from the optical processing means and to generate an electrical signal representative of the intensity of the field associated with said filtered beam;

- means for processing said electrical signal, arranged to provide the value of a requested quantity;

characterized in that the spatial filter is a band-pass optical filter originating, on the detection means, a continuous field distribution that is the sum of a plurality of functions which are identical to one another apart from the sign, are centered exactly in correspondence with a discontinuity point and only depend on the characteristics of the band-pass filter, said field distribution having an intensity exhibiting a pair of marked maxima separated by a minimum in correspondence with each discontinuity point, the electrical signal processing means being arranged to determine the position of said minimum relative to an optical axis of the optical processing means.

13. (Previously Presented) A device as claimed in claim 12, characterized in that said electrical signal processing means comprises a band-pass filter, with temporal cut-off frequencies corresponding with the spatial cut-off frequencies of the optical band-pass filter.

14. (Previously Presented) A device as claimed in claim 12, characterized in that said object is located in the monochromatic light beam at such a position that at least one of said discontinuity points is formed by an edge of the object.

15. (Previously Presented) A device as claimed in claim 12, characterized in that said optical band-pass filter is arranged to originate, on said detection plane, a continuous field distribution comprising, in correspondence with each discontinuity point, oscillating groups of which the oscillation frequencies and the durations depend on the characteristics of the band-pass filter, and the oscillation center is related with the position of the respective discontinuity point, the oscillating groups having intensities exhibiting said pair of marked maxima separated by a minimum in correspondence with the oscillation center.

16. (Previously Presented) A device as claimed in claim 15, characterized in that said optical band-pass filter is an element comprising an opaque region centered on the axis of the beam and having a first width (w_{lo}), and a transparent region also centered on the axis of the beam and having a second width (w_{hi}), greater than the first width.

17. (Previously Presented) A device as claimed in claim 16, characterized in that said first and second widths (w_{lo}, w_{hi}) meet the condition $2.5 \leq w_{hi}/w_{lo} \leq 7$.

18. (Previously Presented) A device as claimed in claim 17, characterized in that said first and second widths (w_{lo}, w_{hi}) meet the condition $w_{hi}/w_{lo} = n$, n being an odd integer number.

19. (Previously Presented) A device as claimed in claim 18, characterized in that said first and second widths (w_{lo}, w_{hi}) meet the condition $w_{hi}/w_{lo} = n$, where $n \leq 5$.

20. (Canceled)

21. (Canceled)

22. (Previously Presented) A device as claimed in claim 16, characterized in that the transparent region is an annulus surrounding the opaque region.

23. (Previously Presented) A device as claimed in claim 12, characterized in that said optical band-pass filter is a mask comprising opaque and transparent regions asymmetrically arranged with respect to the axis of the beam.

24. (Previously Presented) A device as claimed in claim 12, characterized in that said optical band-pass filtering is a mask having a gradual transmittance variation between regions arranged in correspondence with the pass band and regions arranged in correspondence with bands to be rejected.

25. (Previously Presented) A device as claimed in claim 12, characterized in that said optical band-pass filter consists of a grating.